NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

AN ANALYSIS OF THE EFFECTS OF PARTICIPATION AND PERSEVERANCE IN HIGH SCHOOL NON-ATHLETIC EXTRA-CURRICULAR ACTIVITIES ON THE ASCENT TO HIGHER LEADERSHIP POSITIONS AT THE U.S. NAVAL ACADEMY

by

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March 2000

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REPORT DOCUMENTATION PAGE

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE March 2000	3. REPORT TYPE AND DATES COVERED Master's Thesis

4. TITLE AND SUBTITLE :An Analysis of the Effects of Participation and Perseverance in High School Non-Athletic Extra-Curricular Activities on theAscent to Higher Leadership Positions at the U.S. Naval Academy	5. FUNDING NUMBERS
6. AUTHOR(S) Ward, Harry P.	

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.	12b. DISTRIBUTION CODE

13. ABSTRACT *(maximum 200 words)*

This thesis attempts to answer the following research questions: (1) Does participation or perseverance in non-athletic extra-curricular activities in high school (defined as attaining membership or persisting in the same activities throughout high school) result in better leadership performance at the Naval Academy? (2) Can a measure be devised to predict leadership performance at the U.S. Naval Academy based on demonstrated participation and perseverance in high school non-athletic extra-curricular activities? To analyze these questions, a quantitative analysis of the Naval Academy classes of 1994 through 1998 is undertaken to determine if there is a significant relationship between perseverance in extra-curricular activities in high school and leadership ascent at the Naval Academy.

14. SUBJECT TERMS Leadership, Training, Recruitment, Naval Academy		15. NUMBER OF PAGES 75
		16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL

AN ANALYSIS OF THE EFFECTS OF PARTICIPATION AND PERSEVERANCE IN HIGH SCHOOL NON-ATHLETIC EXTRA-CURRICULAR ACTIVITIES ON THE ASCENT TO HIGHER LEADERSHIP POSITIONS AT THE U.S. NAVAL ACADEMY

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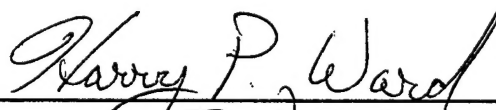Major, United States Marine Corps
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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the
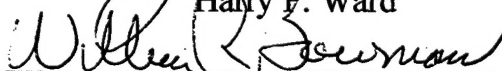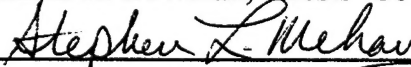
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This thesis attempts to answer the following research questions: (1) Does participation or perseverance in non-athletic extra-curricular activities in high school (defined as attaining membership or persisting in the same activities throughout high school) result in better leadership performance at the Naval Academy? (2) Can a measure be devised to predict leadership performance at the U.S. Naval Academy based on demonstrated participation and perseverance in high school non-athletic extra-curricular activities? To test these questions, a quantitative analysis of the Naval Academy classes of 1994 through 1998 is undertaken to determine if there is a significant relationship between perseverance in extra-curricular activities in high school and leadership ascent at the Naval Academy.

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I. INTRODUCTION

A. BACKGROUND

The United States Naval Academy has served as a training ground for leadership during the last one hundred and fifty five years. The Naval Academy is the crucible for providing leadership in the fleet. Great leaders from World War II, Admiral Nimitz and Admiral Spruance, the past Commandant of the Marine Corps, General Lejeune, the father of the Nuclear Navy, Admiral Rickover, former President Jimmy Carter, former Secretary of the Navy James Webb and Senator John McCain all occupied leadership billets at the Naval Academy where leadership and academic prowess are viewed equally (Bowman, 1990).

Historically, leadership positions during a Midshipman's first-class year are assigned based on the previous three years' performance records. First-Class year is the capstone of the leadership developmental process where every First-Class Midshipman wears the stripes that identify them with their particular leadership position in the Brigade of Midshipmen. One-stripers commonly filling squad leader billets, two-stripers fill platoon leader positions, three-stripers are often company commanders and team captains, four-stripers can command battalions, five-stripers are often in charge of regiments and the Brigade Commander is a six-striper. The statistical analysis in this thesis (Chapter IV) reveals a clear distinction between three groups: (a) one-stripers and below; (b) two-stripers; and (c) three-stripers and above. Table 1.1 shows the means of three performance

(c) three-stripers and above. Table 1.1 shows the means of three performance measures by striper 'status.' The performance measures are AQPR, defined as the cumulative academic Quality Point Rating of the First-Class Midshipman over four years at the Naval Academy, CQPR, which is the cumulative conduct quality point rating over four years at the Naval Academy, and MQPR, which is the cumulative military quality point rating over four years at the Naval Academy. In particular, Table 1.1 shows that the mean level of performance on all three of these measures tends to be highest for the "three stripers plus" group. By further analyzing these groups, this thesis will analyze the predictive power of the

Table 1.1. Mean Levels of Performance

Highest Striper Position	Statistic	AQPR	MQPR	CQPR
One	Mean	2.7476	2.9729	3.7097
	N	2091	2091	2091
	Std. Devn.	.4723	.4794	.2391
Three+	Mean	3.1418	3.6787	3.8439
	N	851	851	851
	Std. Devn.	.4565	.3155	.1491
Two	Mean	2.8924	3.3405	3.7815
	N	1822	1822	1822
	Std. Devn.	.4455	.4058	.1872
Total	Mean	2.8734	3.2396	3.7612
	N	4764	4764	4764
	Std. Devn.	.4805	.5011	.2121

created measures of participation, quitting and persistence habits in non-athletic extra-curricular activities in high school in determining achievement of these striper leadership positions.

This country needs to ensure that the U.S. Naval Academy will continue to provide Naval and civil leaders of the future, and it is critical that the Academy choose applicants that are not only academically strong, but that embody the traits of leadership. The hypothesis of this thesis is that, in addition to observed personal characteristics and cognitive ability, one may approximate leadership potential by newly derived measures of participation and perseverance in high-school non-athletic activities. Reasons for this belief are rooted in the eclectic writings of psychologists (Bednar, Wells; Peterson, 1989; Brockner, 1988; Ghemawat, 1991; Meyer and Allen, 1997) and the writings of Samuel Smiles (Smiles, 1997).

The academy's elaborate application screening process is directed toward identifying who is most likely to succeed in meeting the Naval Academy mission: "To develop midshipmen morally, mentally and physically and to imbue them with the highest ideals of duty, honor and loyalty in order to provide graduates who are dedicated to a career of Naval service and have potential to assume the highest responsibilities of command, citizenship and government." The current system is based on a Candidate Multiple index score based upon high school activities and achievements – mostly academically related measures like grades, SAT Math scores, SAT Verbal scores, career interests, and composite score for

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both athletic and non-athletic activities. The current non-athletic measures are used as a prediction of attitude and perseverance – critical to the fabric of leaders.

The purpose of the composite score is to predict leadership ascent at the Naval Academy and in the fleet. The problem, however, is that the current measure weights all non-athletic extra-curricular activities equally, and activities that are not directly related to leadership ascent may statistically offset the impact of those measures that do accurately predict leadership potential.

B. PURPOSE

The purpose of the Naval Academy is to professionally develop Midshipmen in the art of leadership. Leaders can be characterized by participation and perseverance in activities over time where the path is rough and fraught with obstacles. The basic premise of this study is that the Naval Academy Admissions Board should be made aware of the tendencies and habit patterns of Midshipman candidates which indicate a propensity for acquiring higher leadership positions at the Naval Academy. If successful in this objective, the thesis will provide information to the Admissions board to allow them to better select the very best and brightest applicants who will succeed at the Academy and subsequently guide the Navy and Marine Corps in future years.

The purpose of this study is to determine if predictors of Midshipmen leadership can be identified from the applicant files used by the Academy to ascertain the eligibility of high school applicants. If such predictors can be identified, then it will be possible to use this information to develop an improved

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candidate multiple index that can be used to select applicants who are more likely to succeed academically while also being more likely to ascend to higher leadership positions by the First-Class (i.e., senior) year.

C.   SCOPE AND METHODOLOGY

This study will begin with a historical review of the mission of the U.S. Naval Academy and the role of the Naval Academy Admissions Board. The thesis will examine in detail how the Admissions Board assigns a Candidate Multiple to each candidate's record and the role of the non-athletic ECA component. The literature review focuses on perseverance and participation principles and examples, and a theoretical review of studies of self-esteem and commitment for youths. Data obtained from the Naval Academy archives for the Classes of 1994 through 1998 are examined to test the hypothesis that participation and persistence in non-athletic ECA's in high school is causally related to ascent to high leadership positions at the Naval Academy. The thesis will conclude with a comparison of the newly created measures of participation and perseverance with the current non-athletic ECA composite score to determine which measure better predicts ascent to higher leadership positions at the Naval Academy.

D.   ORGANIZATION OF STUDY

The thesis is organized into five chapters: Chapter I – Introduction (this chapter); Chapter II - Literature Review; Chapter III - Quantitative Model Specification of Leadership Ascent; Chapter IV - Empirical Results; and Chapter V - Summary, Conclusions and Recommendations.

Chapter II - Literature Review

The literature review examines leadership development and its role at the U.S. Naval Academy. It concentrates on the topics of self-esteem, participation and perseverance in leadership development during formative stages of the individual. This part of the thesis will help construct a sound theoretical basis for demonstrated perseverance and participation in high school non-athletic extra-curricular activities that can be linked to subsequent ascent to higher leadership positions at the U.S. Naval Academy.

Chapter III - Quantitative Models of Leadership Ascent

The Naval Academy's leadership development can be measured primarily in three ways: military performance grades, striper billets held, and conduct grades.

These measures are somewhat related in that those who earn high performance grades are more likely to be assigned to higher striper billets, and they tend to excel in conduct. This study will concentrate, however, on the selection of First-Class Midshipmen to higher positions of responsibility in the brigade. The selection to striper billets is the purest measure of leadership at the Naval Academy, and is highly correlated with the cumulative academic, military performance and conduct grades achieved. The correlation of striper billets to these performance measures is shown below in Figure 1.1:
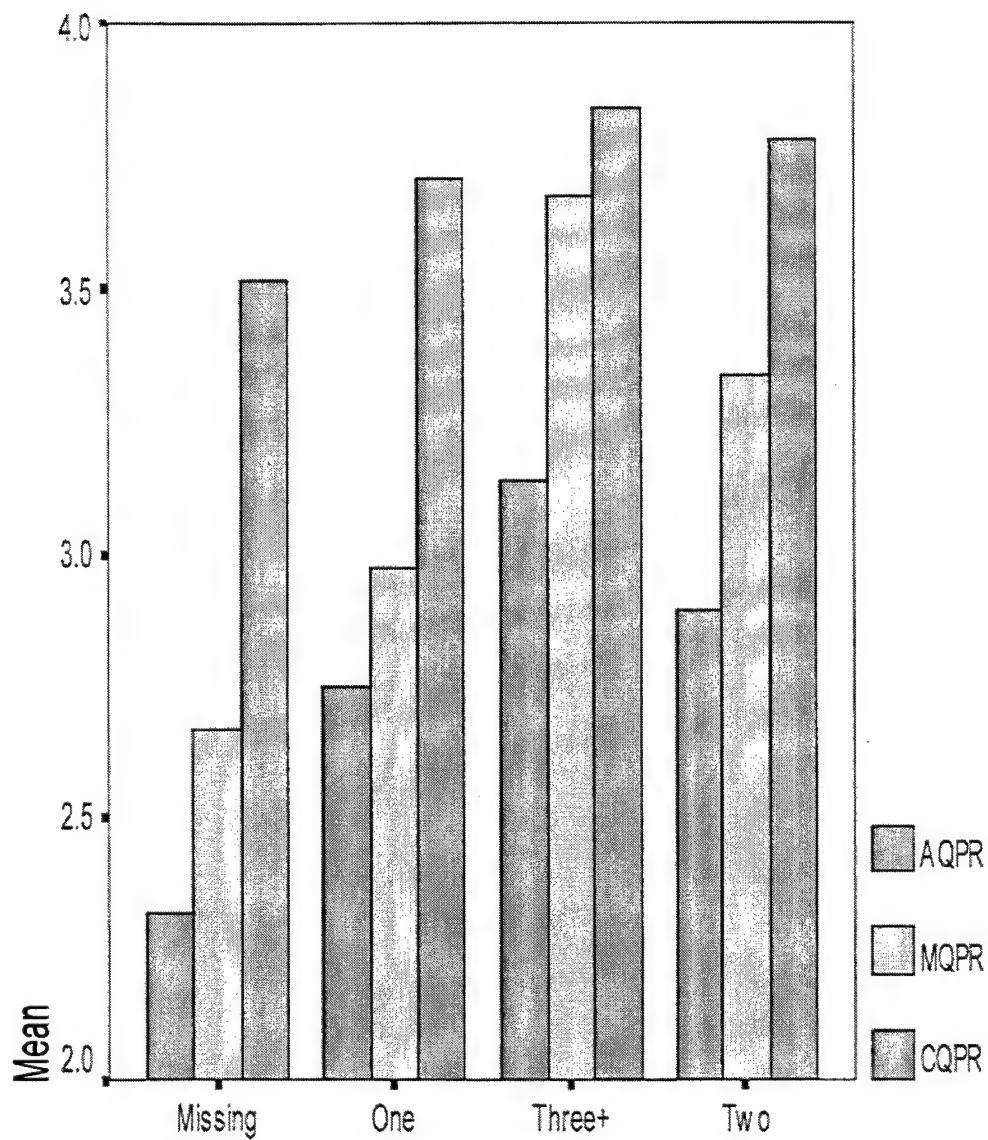
Figure 1.1. Mean Levels of Performance

As such, selection to striper billets is viewed as the final, all-encompassing measure of the inherent leadership abilities of the First-Class Midshipmen.

The models are designed to test the relationship between selection to higher leadership positions in the Brigade and personal characteristics, cognitive abilities, and what normally is an "unobserved" motivation factor. A unique feature of this thesis is an ability to measure this motivation factor that is seldom observable in standard data sets. In the thesis the motivation factor is approximated by participation in key high school non-athletic extra-curricular activities. A comparison model will use the current measure of non-athletic ECA's (in the Candidate Multiple), which is based on a normalized 800 point scale. Through this comparison we will determine the relative effectiveness of the new measure versus the non-athletic component index currently used by the Naval Academy (to derive the Candidate Multiple) in predicting Midshipmen leadership.

Chapter IV - Empirical Results

This chapter discusses the results of estimating the models specified in the previous chapter. The data are provided by the Naval Academy and include, in addition to personal demographic and cognitive background factors, self-reported participation in non-athletic extra-curricular activities during high school for the Naval Academy classes of 1994 through 1998. The data analysis is based upon four model variants, each being successively more inclusive and complex. Each model explains the highest striper billet attained during the first-class year as a

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fraction of self-reported characteristics of participation and perseverance in high-school non-athletic extra-curricular activities. The sample analyzed is the population of those high school applicants who were successfully inducted into the Naval Academy in the Classes 1994-1998.

Chapter V - Summary and Conclusions

This chapter summarizes the empirical findings in the Thesis, and presents conclusions and recommendations based on those findings. The summary encapsulates the history of leadership development at the Naval Academy and the importance of the Naval Academy Admissions Board in determining the best and brightest candidates allowed entry.

The conclusion explains the findings in quantitative measures and qualitative concepts in terms of the demonstrated importance of participation and perseverance on leadership positions in the Brigade of Midshipmen. The potential application to the procedure for selecting among candidates qualified for admission to the U.S. Naval Academy are outlined in detail. The recommendations based on the thesis findings are two-fold: first, the Candidate Multiple should be changed to reflect the new measurement procedures for non-athletic extra-curricular activity involvement in high school; and second, further applications of these concepts should be examined to determine if one could derive a new athletic composite score to be used in calculation of the candidate multiple.

The author realizes that different billets in the Brigade have differing challenges depending on the type of responsibilities and duties involved. Subsequent studies could further break down the types of leadership positions filled, and their relationship to perseverance and participation in non-athletic Extra-Curricular activities. Command billets could be compared to staff billets, and a further understanding of these relationships could be developed. Finally, application of these models could be applied to determine if these predictors of Midshipmen leadership could also predict later performance in the fleet.

II.   LITERATURE REVIEW

The ten great notions of I-Ching illustrate the unobservable characteristics that are associated with strong, sound leadership at the Naval Academy and beyond. First, *balance* is the place within each of us where the forces of action and receptivity are in proper mix and one experiences true power. Second, *cycles* are defined by the times to push and times to be patient because failure contains the roots of success. Third, *humility* is important because you need to assess your own strengths and weaknesses. Fourth, *leadership* is defined as one who is willing to stand alone. Fifth, the *correct relationship* occurs when we give our support to others the best outcome will be shown. Sixth, *goodness* is important because when one discovers good in others he should imitate it and make the world his own. Seventh, *perseverance* is important because the good things that happen to you come as a result of the work that you do on your character. Eighth, *conditions* are important because the key to a quiet heart is to give up resistance and accept where you are right now, no matter how uncomfortable it may be.. Ninth, *simplicity* is how we find and define for ourselves the "middle path." Finally, *vigilance* is important so that you recognize those moments that contain the seeds of the future for you (Osborn, 2000).

Participation and perseverance in non-athletic extra-curricular activities in high school is assumed here to be the best way to measure these ten unobservable traits in applicants to the Naval Academy. The most important trait indicated by

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these habits is self-esteem, and it is hypothesized that the Naval Academy Admissions Board should direct greater attention to those qualitative areas of a candidate's admissions package that measure self-esteem. Presently, the admissions board assigns all activities equal weights, and the result is a measure which becomes skewed statistically when compared to ascent to higher leadership positions at the Naval Academy. This chapter will show the impressive frequencies of non-athletic extra-curricular participation by candidates of the class of 2003. Subsequently a plethora of perseverance examples from Samuel Smiles is presented followed by a clinical analysis of self-esteem, coping and avoidance techniques when dealing with psychological threats, lines of influence on individual's self-esteem, organizational interaction, commitment in organizations and ultimately an analysis of the stay or leave decision in an organization.

Table 2.1 lists the frequency distribution of non-athletic extra-curricular activities of the Class of 2003. The list shows an impressive percentage of inductees with a breadth of school honors and activities (USNA Catalog, 1999-2000):

Table 2.1. Honors and Activities of the Class of 2003

School Honors and Activities	Percent (Not Cumulative)
Student body/council/government President or vice president	10
Class president or vice president	12
School club president or vice president	27
School publication staff	21
National Honor Society	52
Dramatics, public speaking, debating	87
Leader of musical group	10
Eagle Scout/Gold Award	9
Boys/Girls State or Nation	17
Reserve Officer Training Program	9
Sea Cadets	2

The current measure of these activities is a normalized score that is based upon the counts of all possible non-athletic events. There is no extra consideration given for participation or perseverance patterns in those key activities that lead to desired outcomes (leadership ascent). The role of the Admissions Board in this mission is to provide the best and brightest candidates who have abilities and traits that will lend them to leadership ascent at the Academy and beyond.

The relationship between perseverance and participation habits of individuals with their eventual success in life is not a new concept. In *Self-Help*, with illustrations of Conduct and Perseverance, Samuel Smiles states:

> The instances of men, in this and other countries, who, by dint of persevering application and energy, have raised themselves from the humblest ranks of industry to eminent positions of usefulness and influence in society, are indeed so numerous that they have long ceased to be regarded as exceptional. Looking at some of the more

remarkable, it might almost be said that early encounters with difficulty and adverse circumstances was the necessary and indispensable condition of success. (Smiles, 1997)

D'Avenant addresses diligent application most appropriately:

"Rich are the diligent, who can command Time, nature's stock! And could his hour-glass fall, Would, as for seed of stars, stoop for the sand, And, by incessant labor, gather all." (Smiles, 1997)

Disraeli the elder held that the secret of success consisted in being master of your application and study. Hence, it happens that the men who have most moved the world, have not been so much men of genius, strictly so called, as men of intense mediocre abilities, and untiring perseverance; not so often the gifted, of naturally bright and shining qualities, as those who have applied themselves diligently to their work, in whatsoever line that might lie. (Smiles, 1997)

Sir Robert Peel, as a boy at Drayton Manor, was trained by his father to repeat as much of Sunday's sermon as he could remember. Little progress was made at first, but by steady perseverance the habit of retention became powerful, and the sermon was repeated almost verbatim. Later in life he could be found replying in succession to the arguments of his parliamentary opponents - an art in which he was perhaps unrivaled – and yet, it wasn't surmised that the extraordinary power of accurate memory which he displayed on such occasions had been originally trained under the discipline of his father in the parish church of

Drayton. (Smiles, 1997) In like manner, this unobservable pattern of complete attention to detail led to his success and ascent to leadership in later life.

George Stephenson, when addressing young men, was accustomed to sum up his best advice to them, in the words, "Do as I have done – persevere." (Smiles, 1997)

The greatest men are not those who "despise the day of small things, but those who improve them the most carefully." (Smiles, 1997, p. 64) It is not accident, then, that helps a man in the world so much as purpose and persistent industry. To the feeble, the sluggish and purposeless, the happiest accidents avail nothing, - they pass them by, seeing no meaning in them. But it is astonishing how much can be accomplished if one is prompt to seize and improve the opportunities for action and effort which are constantly presenting themselves. With perseverance, the very odds and ends of time may be worked up into results of the greatest value. An hour in every day withdrawn from frivolous pursuits would, if profitably employed, enable a person of ordinary capacity to go far towards mastering a science. It would make an ignorant man a well-informed one in less than ten years. (Smiles, 1997)

> All nations have been made what they are by the thinking and the working of many generations of men. Patient and persevering laborers in all ranks and conditions of life, cultivators of the soil and explorers of the mine, inventors and discoverers, politicians, all have contributed towards the grand result, one generation building upon another's labors, and carrying them forward to still higher stages. This constant succession of noble workers – the artisans of civilization – has served to create order out of chaos in industry,

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science, and art; and the living race has thus, in the course of nature, become the inheritor of the rich estate provided by the skill and industry of our forefathers, which is placed in our hands to cultivate, and to hand down, not only unimpaired but improved, to our successors. (Smiles, 1997)

The Naval Academy Admissions Board is tasked with evaluating the leadership potential of candidates as closely as possible. One of the key traits the Admissions Board should judge in any potential leader is their self-esteem. It is postulated that those who persevere and participate in key activities are those who have a high view of themselves which allows them to cope with short-term disappointments in any organization, and this coping ability translates into even higher self-esteem and intrinsic qualities which will lead to leadership success at the Naval Academy and in the Naval Service. The origin of *self-esteem* is a very intriguing question. It is not fixed at any point in a person's life span, it is a very dynamic concept. Behavioral dispositions change constantly, feelings of personal worth are highly responsive to authentic, consistent feedback from either the social environment or self-evaluations. Favorable internal feedback is more potent and long-lasting than negative feedback from either source. However, feelings of personal approval are responsive to the evaluative thoughts of self and others. (Bednar, Wells, Peterson, 1989)

Psychological threat is unavoidable, it is a reality for all Midshipmen. It is particularly intense for an individual in higher leadership positions at the Naval Academy. Everyone inducted into the Academy is vulnerable to psychological

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threat, and overcoming this threat is one of the most basic processes involved in personal growth and leadership development at the Academy. The frequency and continuum of psychological threat can vary from very high(plebe summer/year, higher striper billets) to very low (Third-class year). (Bednar, Wells, Peterson, 1989)

There is an inverse relationship between levels of self esteem and psychological threat: as self-esteem increases, the frequency and intensity of psychological threats decrease; as self-esteem decreases, the frequency and intensity of psychological threat increases. Coping and avoidance are techniques for dealing with psychological threat based on attributes and intrinsic qualities of which lend themselves to either increasing or decreasing psychological threat. The act of avoidance (quitting) literally precludes the possibility of new learning. Its' primary function is to avoid fear and anxiety. If it does anything with certainty, it provides people with personal experiences and perceptions of themselves as unable to deal with anxiety, fear, or conflict (all traits negatively associated with leadership ascent). Such experiences and self-perceptions can only be expected to further impair the person's ability to respond to threatening situations in the future. The result is an increase in the frequency and intensity of perceived psychological threats, which denies the ability to ascend to higher leadership positions. (Bednar, Wells, Peterson, 1989)

Conversely, the act of coping with personal conflict requires risk-taking, personal responsibility, and willingness to realistically face personal issues (all traits associated with positions of high leadership). When this is done successfully, people not only broaden their understanding of themselves and the world they live in, they also experience themselves as able to deal with threatening situations productively. This is a powerful consideration in any definition of self. It allows a person to approach threatening situations in the future with far less fear and anxiety than might normally be expected. (Bednar, Wells, Peterson, 1989)

Coping is defined as a process of realistically facing up to difficult issues that involve such desirable psychological attributes as self-examination, insight, reality testing, risk taking, and personal responsibility. On the other hand, avoidance and defense are based on a process of denial, distortion and self-deception as a means of avoiding fear and anxiety. The role of internal feedback, external/social feedback, and personal response styles in the development and maintenance of a high or low level of self-esteem is crucial to understanding the dynamic nature of self-esteem. The chart below shows the interrelationships of these concepts and how they affect each other in Table 2.2.

Table 2.2. Lines of Influence

```
Self Generated-High --- High ------- High----- High
Approval        .        .           .          .
  .             .        .           .          .
Internal       Self ---Psychological-----Personal-Self
Feedback       esteem  Threat          Response Evaluation
  .             .        .                .         Style
  .             .        .             .          .
  .             .        .           .          .
Self Generated-Low --- Low ----------Low -----Low
Disapproval     .
              .. External/Social Feedback
```

(Source: Bednar, Wells, Peterson, 1989)

One of the most significant personality dimensions in which people differ is the trait of self-esteem. High self-esteemers differ from low self-esteemers in the way they think, feel and perhaps more importantly, behave. Individual's self-esteem affects the impact of the organization's socialization practices on their adjustment to the organization. It affects most notably the way individual's behave after they have attained full-fledged membership in the organization. (Brockner, 1988) For example, two individuals receive the exact same negative feedback from their organizational superior. In the months after this feedback, one individual exhibits a remarkable increase in motivation and performance, whereas the other shows a sharp decline, and may rationalize quitting because of the negative feedback. Further, two persons are in the same stressful environment in which roles are ambiguous and conflicting. One person invariably enjoys greater

success than the other, and may thrive while the latter person becomes discouraged and ponders or may actually leave the organization.

In these examples of interaction in organizations, one of the greatest determinants of the decisions to commit to or leave an organization is self-esteem. Thus, relative to low self-esteemers, high self-esteemers are:

- More apt to work harder in response to negative feedback.

- Less negatively effected by chronic stressors like role ambiguity and conflict. (Brockner, 1988)

The habit of commitment to organizations is very revealing in terms of the relative self-esteem and emotional maturity of different individuals. Jose Ortega y Gasset explains it most succinctly:

> At every moment of my life there opens before me diverse possibilities: I can do this or that. If I do this, I shall be A the moment after; if I do that, I shall be B,.... Man must not only make himself: the weightiest thing he has to do is to determine what he is going to be. Jose Ortega y Gasset, *History as a System* (Ghemawat, 1991)

Commitment can be broken up into several types, and it is these different types of commitments that apply to individuals who decide to participate or persevere in high school non-athletic extra-curricular activities. Attitudinal commitment focuses on the process by which people come to think about their relationship with the organization. In many ways it can be thought of as a mind set in which individuals consider the extent to which their own values and goals are congruent with those of the organization. Affective commitment refers to

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emotional attachment to, identification with, and involvement in the organization which make individuals *want* to stay with the organization. The individual may be locally committed to their supervisor, globally committed to top leadership, committed to both, or not committed to either. (Meyer, Allan, 1997)

There are attitudinal consequences for young adults when they decide to stay with or leave an organization. In relation to the theory of dissonance, two cognitions which are obverse to each other are the phenomenons of satisfied stayers or dissatisfied leavers, and satisfied leavers or dissatisfied stayers. The intensity of motivation to reduce this type of paradox is a function of the magnitude of the dissonance inside the individual, so it is this feeling of satisfaction or dissatisfaction which drives the individual to make the stay or leave decision. Subsequent to the decision, self-justification will occur in every case to protect the individual's self-concept. (Mowday, Porter, Steers, 1982)

All of these concepts are important when an individual is participating in an activity, and a decision point arrives at which the individual decides to participate, persevere or quit activities in which they participate in high school. One may hypothesize that the patterns of participation, perseverance or quitting of key activities in high school indicates the individual's level of self esteem to the Naval Academy admissions board. It is hypothesized that a person who enjoys high self-esteem will tend to ascend to higher leadership positions at the U.S. Naval Academy and beyond.

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III. QUANTITATIVE MODEL SPECIFICATION OF LEADERSHIP ACHIEVEMENT

This chapter is divided into three parts: (1) a discussion of the dependent variable chosen for the multivariate models; (2) a discussion of the independent variables, especially that of persistence; and (3) a discussion of the modeling specifications used to test the hypothesis that participation and perseverance in key non-athletic extra-curricular activities in high school will lead to achievement of higher leadership positions at the Naval Academy.

A. THE DEPENDENT VARIABLE

The data are based upon the high school applicant files of Midshipmen inductees of the Classes of 1994 through 1998. Unlike the current composite score used by the Naval Academy admissions board, this study will build a composite score using only those non-athletic extra-curricular activities that are found to be statistically significant in a bivariate regression on leadership achievement. The multinomial logit estimation procedure was chosen for this thesis because of its ability to analyze the impact of specified variables on several (in this case three) mutually exclusive outcomes. There are three leadership groups that a First-Class Midshipman could ascend to during their final year at the Academy. With three outcomes, the logit (maximum likelihood) estimates the relative log-odds of two outcomes compared to a base outcome:

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$$- \qquad \text{Log}(P2/P1) = \text{Alpha}(2-1) + \text{Beta}(2-1)X1$$

$$- \qquad \text{Log}(P3/P1) = \text{Alpha}(3-1) + \text{Beta}(3-1)X1$$

In these equations, the intercepts sum to one and the coefficients sum to zero, thus:

$$- \qquad \text{Log}(P3/P2) = \text{Alpha}(3-2) + \text{Beta}(3-2)X1 = (1- \text{Alpha}(3-2)) + (\text{Beta}(3-1) - \text{Beta}(3-2))$$

The dependent leadership variable ("Stripe1C") takes on one of three values corresponding to the highest striper rank achieved during First-Class year at the Academy:

- 0 = One Stripe or less, Midshipman-in-Ranks.

- 1 = Two Stripes.

- 2 = Three or More Stripes.

Table 3.1 shows the distribution of the sample in the three categories for the dependent variable. Note that only 17.9 percent of the sample achieved three or more stripes in the First-Class year.

Table 3.1. Categories of First-Class Year Stripers

Highest Striper Rank First Class Year	Percent
One-	43.9
Two	38.2
Three+	17.9

This definition was chosen because of the pattern observed where a Midshipman holds a high striper billet one semester and then becomes a one-

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striper or Midshipman in Ranks (i.e., – no stripes) the following semester. The division between stripers arises from the frequency distribution listed above, and the belief that there is a difference between one-stripers, two stripers, and three-stripers and above in terms of the authority, accountability and responsibility of the associated positions. Assume that the dependent variable is discrete with values 1-6. Note that the distribution is not normal, thus it creates a trichotomous variable that coincides with natural differences in authority.

B. INDEPENDENT VARIABLES

Demographic control variables were chosen in accordance with the diverse nature of the Naval Academy inductees. It is hypothesized that performance may differ between males and females and between different race/ethnic groups. Race/ethnicity is controlled through inclusion of binary variables for BLACK (African-American candidates), HISP (Hispanic candidates), OTHER (candidates from races other than white, hispanic or black). Sex is accounted for by using a binary variable for FEMALE (female candidates), service experience or exposure is controlled through use of the variable PRIORENL (candidates with previous service) and MILPNAVY (candidates with at least one Navy veteran parent). Cognitive control variables include high school rank percentile (HSRKPctl), highest SAT Math score (SATM) and highest SAT Verbal score (SATV). High school rank percentile (HSRKPctl) is included because it measures relative academic achievement during the high school experience, taking class size into

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consideration. SAT scores are included to measure the candidate's aptitude for learning concepts at the undergraduate level relative to their peers.

Participation and perseverance levels in significant non-athletic extra-curricular activities in high school are measured as a categorical variable (NECA) on a scale of participation ranging in value from zero to two:

- If < 45 % of students in an applicant's high school activity engaged in that non-athletic activity for two or more years, then the applicant is assigned a value of zero or one, depending on the number of years he/she engaged in the activity. A score of zero equals none, and a score of one means the individual participates one or more years. In the latter case, the participation variable (partic) = 1.

- If >= 45% of students in an applicant's high school activity engaged in that non-athletic event for 2 or more years, an applicant is assigned a value of zero through two, depending on the number of years he/she engaged: If she/he engaged 0 years (= none) or 1 year (= 1 year) then the quit variable (quitt) = 1; if he/she engaged 2 years or more, the persistence variable (persit) = 1.

A zero for NECA (defined as the particular extra-curricular activity observed) indicates non-participation in the activity by the candidate. A score of one indicates participation in the activity (defined by the variable "partic") or shows a candidate who joined an activity for one year and then quit the activity (defined by the variable "quitt"). A value of two indicates a candidate who was engaged in an activity for two or more years and who "persevered" in the particular organization or activity during their time in high school (defined by the variable "persit").

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In the final models, the categorical variable is broken into three parts defined by the size of the high school. The reason the variables are broken up is because of the belief that the size of the interaction group in key organizations may have an effect on the leadership characteristics of the candidate. A small school is defined as less than or equal to 100 in the graduating class. A medium size school is defined as a school with between 100 and 300 in the graduating class. A large size school is defined as more than 300 in the graduating class. An activity is considered "significant" in being included in a categorical variable only if the activity is statistically significant ($p<=.05$) in a bivariate regression on the dependent leadership variable.

Unlike the current composite used by the Naval Academy admissions board, this study will build a composite score using only the non-athletic activities that are statistically significant in the initial bivariate leadership achievement regression. The following table summarizes the results of the bivariate linear regressions on leadership achievement as a function of participation and perseverance in key non-athletic extra-curricular activities in high school. There are 86 identified non-athletic activities that are coded in the applicant file. In the bivariate model of leadership ascendancy, this study finds 16 of the activities are statistically significant and 70 are statistically insignificant in the leadership model. For each Midshipman, the activities will be coded as participation (0,1 variables if 1 means participate (partic = 1)) or persistence (0,1,2 variables – if 1

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means quit (quitt=1) or if 2 means persist (persit = 1)) depending on the percentage of participants engaged in the activity two or more years. Ultimately, a count of the quits, participates and persists per Midshipman will be taken to determine the final values of quits (variable – quitt), participates (variable- partic) or persists (variable – persit) per Midshipmen. The final values can vary from 0 to 8 for partic and persit, and from 0 to 6 for quitt depending on the particular Midshipman. When the quitt variable is divided into small, medium and large variants for school size the values range from 0 to 8 for sm*quitt, 0 to 16 for md*quitt and 0 to 24 for lg*quitt. When the partic variable is divided similarly for school size the values range from 0 to 6 for sm*partic, 0 to 16 for md*partic and 0 to 21 for lg*partic. When the persit variable is divided for school size the values range from 0 to 6 for sm*persit, 0 to 16 for md*persit and 0 to 21 for lg*persit. The results of these findings are outlined in Table 3.2 below.

Table 3.2. Significant Non-Athletic Extra-Curricular Activities

Non-Athletic Activity	Statistically Significant (<=.05 level)	Statistically Insignificant
Class President (PRESA)	X	
Club President (PRESB)	X	
Student Government President (PRESC)	X	
Class Vice President (VPA)	X	
Club Vice President (VPB)	X	

Table 3.2 (Continued)

Non-Athletic Activity	Statistically Significant (<=.05 level)	Statistically Insignificant
Student Government Vice President (VPC)	X	
Class Secretary (SECRTA)	X	
Club Secretary (SECRTB)	X	
Student Government Secretary (SECRTC)	X	
Class Representative (REPRA)	X	
Club Representative (REPRB)	X	
Student Government Representative (REPRC)	X	
Editor in Chief (EDITOR)	X	
Business Circulation or Advertising Manager (BUSMGR)		X
Feature, Sports, News or Photo Editor (FEATURE)		X
Writer-Reporter or Other Staff Member (REPORTR)		X
Boy's/Girl's Nation (NATION)		X
Boy's/Girl's State (STATE)	X	
National Honor Society (NHS)	X	
Country, City or Local Award (LOCALA)	X	
National or State Award (NATLA)	X	

Table 3.2 (Continued)

Non-Athletic Activity	Statistically Significant (<=.05 level)	Statistically Insignificant
Other Award (OTHERAA)	X	
Beta Club (BETA)		X
Private Pilot's License (PILOTPRV)		X
Commercial Pilot's License (PILOTCOM)		X
Radio Operator's License (RADIO)		X
Foreign Exchange Officer (FOREXCH)		X
Grand Master Demolay (DEMOLAY)		X
Boy Scouts 1-12		
1 – MEMBER		X
2 – EAGLE		X
3 – SENIOR PATROL LEADER		X
4 – JR. ASS'T SCOUTMASTER		X
5 – ASS'T SCOUTMASTER		X
6 – QUARTERMASTER		X
7 – POST PRESIDENT		X
8 – CABINET OFFICER		X
9 – AGE OR CREW LEADER		X
10 – SILVER		X
11 – ASSOCIATE ADVISOR		X
12 – ATTENDED JAMBOREE		X
Girl Scouts 1-6 (GSCOUT)		
1 – MEMBER		X
2 – 1ST CLASS		X

Table 3.2 (Continued)

Non-Athletic Activity	Statistically Significant (<=.05 level)	Statistically Insignificant
3 – TROOP OFFICER		X
4 – PATROL LEADER		X
5 – ASS'T LEADER		X
6 – ATT. WORLD OPP. EVENTS		X
Camp Fire 1-6 (CAMPER)		
1 – HORIZON CLUB MEMBER		X
2 – CAMP COUNSELOR		X
3 – REP/REGIONAL MEETINGS		X
4 – ASS'T LEADER		X
5 – REP/NATIONAL MEETINGS		X
6 – MEMBER LOCAL COUNCIL BOARD		X
Civil Air Patrol 1-5 (CIVILAR)		
1 - MEMBER		X
2 - OFFICER		X
3 – AMELIA EARHART AWARD		X
4 – GEN. BILLY MITCHELL AWARD		X
5 – OTHER AWARD		X
Music Director Orchestra (MUSICDA)		X
Music Director Band (MUSICDB)		X
Music Director Chorus (MUSICDC)		X
Music Member Orchrestra (MEMBERA)		X
Music Member Band (MEMBERB)		X

Table 3.2 (Continued)

Non-Athletic Activity	Statistically Significant (<=.05 level)	Statistically Insignificant
Music Member Chorus (MEMBERC)		X
Dramatic Reading (DRAMA)		X
One-Act Play (ONEACT)		X
Three-Act Play (THREACT)		X
ROTC (ROTC)		X
ROTC Officer (ROTCO)		X
Sea Cadet (SCADET)		X
Junior Achievement (JRACH)		X
4H Club Judge (J4H)		X
Sailing Association (SAIL)		X
Church Group (CHURCH)		X
Debate (DEBATE)		X
Two or More Speeches (SPEECH)	X	
Master of Ceremonies (EMCER)		X
Camp Counselor (COUNS)		X
Coach (COACH)		X
Teacher or Lab Assistant (TEACH)		X
Honorary Speech (HONSP)		X
TV Panel (TVPANL)		X
Cheer Leader (CHEER)		X
Drill Team (DRILL)		X
Working 1 – Grade 10		X
2 – Grade 11		X
3 – Grade 12 (WORKG)		X

Table 3.2 (Continued)

Non-Athletic Activity	Statistically Significant (<=.05 level)	Statistically Insignificant
Work Hours (WORKHRA) < 9 hr	X	
10-19 hr		X
20-29 hr		X
30 – 39 hr		X

Tables 3.3 through 3.5 show the significant non-athletic extra-curricular activities and their associated frequency distributions which determined their classification as participation (0,1) or persistence (0,1,2) variables.

Table 3.3. Non-Athletic Extra-Curricular Activities

Non-Athletic Activity	Percent Participating Two+Years
National Honor Society (NHS)	4.2%
Two or More Speeches (SPEECH)	78.3%
Boy's or Girl's State (STATE)	.5%
National or State Award (NATLA)	41.0%
Other Award (OTHERAA)	45.4%
Class Secretary (SECRTA)	.5%
Club Secretary (SECRTB)	11.6%
Less than 10 hours work/Week (WORKHRA)	NA
Class Representative (REPRA)	49.0%
Club Representative (REPRB)	51.9%
Student Government Representative (REPRC)	68.2%
Cheer Leader (CHEER)	40.0%
Class Vice President (VPA)	7.5%
Club Vice President (VPB)	17.0%

Table 3.3 (Continued)

Non-Athletic Activity	Percent Participating Two+Years
Student Government Vice President (VPC)	18.5%
Class President (PRESA)	13.3%
Club President (PRESB)	27.0%
Student Government President (PRESC)	31.3%

Table 3.4. Participation Non-Athletic Extra-Curricular Activities

Non-Athletic Activity	Percent Participating Two+Years
National Honor Society (NHS)	4.2%
State (STATE)	.5%
Class Secretary (SECRTA)	.5%
Club Secretary (SECRTB)	11.6%
Less than 10 hours work/week (WORKHRA)	NA
Cheer Leader (CHEER)	40.0%
Class Vice President (VPA)	7.5%
Club Vice President (VPB)	17.0%
Student Government Vice President (VPC)	18.5%
Class President (PRESA)	13.3%
Club President (PRESB)	27.0%

Table 3.5.   Persistence Non-Athletic Extra-Curricular Activities

Non-Athletic Activity	Frequency Distribution Two+Years
Two or More Speeches (SPEECH)	78.3%
National or State Award (NATLA)	51.0%
Other Award (OTHERAA)	45.4%
Class Representative (REPRA)	49.0%
Club Representative (REPRB)	51.9%
Student Government Representative (REPRC)	68.2%

C.   MODELING SPECIFICATIONS

The methodology used to analyze the factors that affect leadership ascendancy at the Naval Academy follows a three-step process. In the first model specification, only class year and demographics are included which allows personal characteristics to have an independent effect on leadership ascendancy (See Model One in Table 3.6). Next, cognitive abilities are added to the model to capture the impacts of academics on leadership (Model Two in Table 3.6). In Model Three two separate measures of non-athletic activity participation are included. In the first version (Model 3A) the current non-athletic composite score used in the Candidate Multiple is included; in the second version (Model 3B), the categorical non-athletic variable created in this thesis is substituted for the U. S. Naval Academy's candidate multiple.

The purpose of this statistical methodology is to determine if, after typical observed personal characteristics and cognitive abilities are explicitly controlled, one can identify a separate, independent effect of non-athletic participation and persistence on leadership achievement. In essence, the last model attempts to control for factors that are typically unobserved in models such as these, factors such as motivation and drive.

Because the model is specified as a multinomial logit, Model One, the effects of demographics and the different class years are assumed to determine the tendency to reach a three-striper and above status or to occupy the one-striper and

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below status relative to the middle category of two-stripers. In Model Two, the observable cognitive background of the candidate is added to the demographics and class year to get a complete view of the effects of the observable characteristics of the candidate on leadership achievement at the Academy.

In the first version of Model Three (3A), the Admissions Board's measure of non-athletic ECA participation is now added to observe the effects of non-observable characteristics of potential leadership ascent in a model similar to the whole person multiple model used by the Admissions Board. In the second version of Model Three (3B), we now substitute the new measures of non-athletic participation and persistence (persit, quitt and partic) in place of the Admissions Board's measure of Non_athl.

In the fourth, and last, model specification we introduce the effects of school size for the non-athletic activity variables. In the first version (Model 4A), we interact high school size with the non-athletic composite score. In the final model specification (Model 4B) we interact high school size with three newly created non-athletic activity variables.

It may be noted that the Model Four versions are not as restrictive as the previous models (Three) as the impact of non-athletic participation is permitted to vary by high school size. Table 3.6 summarizes the specifications for the different models discussed in this Chapter.

Table 3.6. Model Specifications

Independent Variables		Model	Specification			
	One	Two	Three A	ThreeB	FourA	FourB
Class Year						
95	X	X	X	X	X	X
96	X	X	X	X	X	X
97	X	X	X	X	X	X
98	X	X	X	X	X	X
Demographic						
Black	X	X	X	X	X	X
Hispanic	X	X	X	X	X	X
Other	X	X	X	X	X	X
Female	X	X	X	X	X	X
Prior Enlisted	X	X	X	X	X	X
Military Parents Navy	X	X	X	X	X	X
Cognitive						
High School Rank %tile	NI	X	X	X	X	X
SAT Math	NI	X	X	X	X	X
SAT Verbal	NI	X	X	X	X	X
Non-Athletic ECA Composite	NI	NI	X	NI	NI	NI
Partic/ Persit Measure	NI	NI	NI	NI	NI	NI
Partic	NI	NI	NI	X	NI	NI
Quitt	NI	NI	NI	X	NI	NI
Persit	NI	NI	NI	X	NI	NI
Sm*Non_At	NI	NI	NI	NI	X	NI
Md*Non_At	NI	NI	NI	NI	X	NI
Lg*Non_At	NI	NI	NI	NI	X	NI
Sm*Partic	NI	NI	NI	NI	NI	X
Md*Partic	NI	NI	NI	NI	NI	X
Lg*Partic	NI	NI	NI	NI	NI	X
Sm*Quitt	NI	NI	NI	NI	NI	X
Md*Quitt	NI	NI	NI	NI	NI	X
Lg*Quitt	NI	NI	NI	NI	NI	X

Table 3.6 (Continued)

Independent Variables		Model	Specification			
	One	Two	Three A	ThreeB	FourA	FourB
Sm*Persit	NI	NI	NI	NI	NI	X
Md*Persit	NI	NI	NI	NI	NI	X
Lg*Persit	NI	NI	NI	NI	NI	X

NI = Not Included

Definitions of Additional Variables:

Sm*Non_At – Non-Athletic ECA composite used by Admissions Board. (Small School – Less than 100 Students)

Md*Non_At – Non-Athletic ECA composite used by Admissions Board. (Medium School – 100-300 Students)

Lg*Non_At – Non-Athletic ECA composite used by Admissions Board. (Large School – More than 300 Students)

Sm*Persit – Persist count in key non-athletic activities. (For small schools < 100 students)

Md*Persit – Persist count in key non-athletic activities. (For medium schools 100 - 300 students)

Lg*Persit – Persist count in key non-athletic activities. (For large schools more than 300 students)

Sm*Quitt – Quit count in key non-athletic activities. (For small school < 100 students)

Md*Quitt – Quit count in key non-athletic activities. (For medium school 100 - 300 students)

Lg*Quitt – Quit count in key non-athletic activities. (For large school more than 300 students)

Sm*Partic – Participate count in key non-athletic activities. (For small school < 100 students)

Md*Partic – Participate count in key non-athletic activities. (For medium school 100 - 300 students)

Lg*Partic – Participate count in key non-athletic activities. (For large school more than 300 students)

In summary, the rationale for the statistical methodology is three-fold: (1) to determine if the "non-observable" motivation factors proxied by non-athletic participation and persistence adds statistical significance to the model of leadership ascendancy; (2) if new measures of participation and persistence are superior to current use of a single non-athletic composite index; and (3) if school size affects the estimated impacts of non-athletic participation patterns on leadership ascendancy.

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IV.   EMPIRICAL FINDINGS

Table 4.1 below shows the sample size, minimum, maximum and standard deviation of each variable used in the models.

Table 4.1.   Descriptive Statistics for Independent Variables

	N	Minimum	Maximum	Mean	Std. Deviation
SATV_HI	5890	.00	800.00	566.6341	72.3090
SATM_HI	5890	.00	800.00	658.2301	64.6219
FEMALE	5890	.00	1.00	.1343	.3410
PRIORENL	5830	.00	1.00	.2228	.4162
MILPNAVY	5890	.00	1.00	.2480	.4319
BLACK	5890	.00	1.00	.1935	.3951
HISP	5890	.00	1.00	7.419E-02	.2621
OTHRACE	5890	.00	1.00	5.925E-02	.2361
YR95	5890	.00	1.00	.1895	.3919
YR96	5890	.00	1.00	.2061	.4045
YR97	5890	.00	1.00	.1985	.3989
YR98	5890	.00	1.00	.2014	.4010
QUITT	5981	.00	6.00	.7674	1.0283
PERSIT: # NAECAs Participate 2+ Years	5981	.00	8.00	1.0828	1.3597
PARTIC: # NECAs Participate	5981	.00	8.00	1.1699	1.2981
SM*QUITT	5981	.00	8.00	3.545E-02	.4413
MD*QUITT	5981	.00	16.00	.2113	1.5451
LG*QUITT	5981	.00	24.00	.3215	2.2735
SM*PERSIT	5981	.00	7.00	.1443	.5958
MD*PERSIT	5981	.00	14.00	.9818	2.1357
LG*PERSIT	5981	.00	24.00	1.3428	3.0945
SM*PARTIC	5981	.00	6.00	.2078	.7649
MD*PARTIC	5981	.00	16.00	1.0754	2.1231
LG*PARTIC	5981	.00	21.00	1.2730	2.7325
HSRKPCTL	5890	.00	1.00	.1195	.1336

Beginning with college board scores, one notices that the mean is about 550 for SAT Verbal scores and approximately 650 for SAT Math scores. In the sample, there are about 13% females, 22% prior enlisted, 25% with one or more Navy parents, 19% black, and less than 1% hispanic and other races. The created variable quitt shows a maximum value of 6 quits per case, and a mean of just under one quit per Midshipman in the sample. The variable persit shows a maximum of 8 persists per case with a mean of just over one persist per Midshipman. The variable partic has a maximum value of 8, with a mean of just over one participation per Midshipman.

The quitt, persit and partic variables are interacted with school size to create the last 9 variables in Table 4.1. The small schools values are kept constant, whereas the medium schools values are multiplied by two and the large schools values are tripled to differentiate school size as a factor. In the case of small schools, sm*quitt has a mean of less than .04 per case, sm*persit is just less than .15 and sm*partic is just below .21. In the category of medium size schools, md*quitt is just below .22, md*persit is just below one and md*partic is just above one. Finally, for large schools lg*quitt has a mean of just below .33, lg*persit is just above one and lg*partic is just above one. Taking into account the multiplication factors for discrimination (i.e., dividing by 2 for md prefixes and by 3 for lg prefixes) one notices that the coefficients at small schools are about half the coefficients at medium schools in each interaction variable which may indicate

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a lessened opportunity to participate, quit or persist in the area of non-athletic extra-curricular activities. In terms of large schools, the quit phenomenon is about equivalent when taking the multiple into account as medium size schools, the participate and persistence coefficients are about a third less at large schools which indicates that the opportunities to participate in those activities may be less because of keener competition in the larger numbers. Overall, these differences indicate that the Naval Academy Admissions Board should consider school size in the computation of the non-athletic ECA composite score.

All of the models utilize the multinomial logit estimation procedure which was briefly discussed in the beginning of Chapter III. The reason for selecting this type of procedure is its ability to analyze the impact of the above variables on the mutually exclusive outcomes of three different striper categories at the Naval Academy. The three categories, one-stripers and below, two-stripers and three-stripers and above were chosen for reasons outlined above. The multinomial logit regression procedure dictates that the two-striper category be coded third so it serves as the base or comparison group. Since it is coded three it will fall out, or become the base comparison group for the regression procedure. The multinomial logit results in determining the marginal effects of participation and perseverance in non-athletic extra-curricular activities in high school on ascent to one of three leadership categories First-Class year at the Naval Academy.

Overall, the use of this procedure results in interpreting the effects of an explanatory variable (i.e., partic, quitt, persit) on the odds of a First-Class Midshipman achieving the one-striper and below or three-striper and above positions when compared to the middle two-striper category. The models and results in this chapter discuss the strengths of this procedure for this particular analysis.

A. MODEL ONE

The first model addresses the effects of basic Individual demographic attributes and class year on the dependent leadership outcomes. The results are shown below in Table 4.2:

Table 4.2. Multinomial Logit Models of Leadership Ascent: Demographics and Class Year Effects (Model One)

Independent Variables	Lowest Striper Category Relative to Middle Category			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
Intercept	1.981	21.71	.000***	.841	2.01	.155
Demographics						
BLACK	.017	.02	.895	-.529	7.0	.008***
HISP	-.431	5.68	.017**	-.613	5.4	.020**
OTHER	.082	.20	.658	-.297	1.2	.271
FEMALE	-.205	4.16	.041**	-.219	3.0	.084
MILPNAVY	.023	.09	.759	-.087	.8	.360
PRIORENL	-.284	12.32	.000***	.047	.2	.671
Class Year						
95	-.454	19.13	.000***	-.281	4.6	.032**
96	-.439	18.62	.000***	-.201	2.4	.121
97	-.372	13.36	.000***	-.040	.1	.760
98	-.154	2.27	.132	-.019	.02	.883

*** - P <= .01, ** - P <= .05

Racial minorities, in general, are less likely to ascend to the highest levels of leadership in the Brigade of Midshipmen, as the logit coefficients on black and Hispanic for the three-and-above striper positions (relative to two-stripers) are negative and statistically significant.

While females are less likely than males to ascend to the highest leadership level (i.e., logit coefficients are negative), they are also less likely to be given the lowest leadership position relative to the two-striper omitted category. The military background of the parents of Academy applicants have no significant impact on Midshipmen leadership positions, while being a prior enlisted reduces the likelihood of being in the lowest striper category. Class year dummy variables are included to distinguish trends among classes over time. No significant differences are noted between the various class years 1994 through 1998.

B.   MODEL TWO

The results of the second model, which adds cognitive abilities to the previous specification, are shown below in Table 4.3.

Table 4.3. Multinomial Logit Models of Leadership Ascent: Cognitive, Demographics and Class Year Effects (Model Two)

Independent Variables	Lowest Striper Category (One Striper, Midshipman In Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
Intercept	-.385	.68	.407	-3.36	28.92	.000***
Demographics						
BLACK	-.040	.09	.766	.506	6.1	.014**
HISP	.390	4.23	.040**	.772	7.88	.005***
OTHER	-.072	.14	.705	.301	1.2	.274

Table 4.3 (Continued)

Independent Variables	Lowest Striper Category (One Striper, Midshipman In Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
FEMALE	.261	6.14	.013**	.154	1.33	.249
MILPNAVY	.011	.02	.89	.096	.97	.324
PRIORENL	.208	4.83	.028**	.349	7.50	.006***
Class Year						
95	.466	19.21	.000***	.292	4.68	.030**
96	.436	17.42	.000**	.228	2.91	.088
Class Year						
97	.366	12.24	.000***	.054	.15	.694
98	.142	1.79	.181	.056	.17	.678
Cognitive Abilities						
HSRKPctl	.007	6.65	.010***	-.018	17.20	.000***
SATV	.000	.00	.985	.002	12.14	.000***
SATM	.000	.02	.873	.001	1.31	.252

*** - P <= .01, ** - P <= .05

After controlling for cognitive abilities, we now observe that Blacks and Hispanics are more likely to ascend to the highest leadership position compared to Whites. Given cognitive abilities, females are still less likely to be assigned to the lowest leadership category and now are assigned to the highest leadership levels in the same similar proportion as males. Apparently the earlier negative findings for females were related to females having lower grades and SAT scores than males. Finally, there were no significant differences related to prior enlisted background in this model that now controls for differences in cognitive abilities.

The most surprising result related to cognitive abilities is that Math SAT scores are not significantly related to First-Class leadership positions. This is

surprising because this variable is the single most important variable in the existing Candidate Multiple score. However, one's class rank and verbal SAT achievement score have positive effects on senior leadership positions of Midshipmen given they are both significant at the .01 level and have positive coefficients supporting higher leadership.

C.   MODEL THREE (VERSION A)

The third model adds the current Academy index to those described earlier. The results of this version are shown below in Table 4.3 (A).

Table 4.3 (A). Multinomial Logit Models of Leadership Ascent: Categorical, Cognitive, Demographics, Class Year Effects

Independent Variables	Lowest Striper Category (One Striper, Midshipman in Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
Intercept	-.325	.48	.486	-3.445	30.02	.000***
Demographics						
BLACK	-.045	.11	.738	.509	6.14	.013**
HISP	.389	4.19	.041**	.777	7.99	.005***
OTHER	-.076	.16	.688	.309	1.26	.262
FEMALE	.268	6.45	.011**	.149	1.23	.266
MILPNAVY	.007	.01	.926	.098	1.01	.314
PRIORENL	.138	1.71	.191	.422	8.95	.003***
Class Year						
95	.469	19.41	.000***	.289	4.59	.032**
96	.441	17.75	.000***	.222	2.76	.097
97	.370	12.52	.000***	.047	.12	.730
98	.148	1.95	.162	.048	.13	.722
Cognitive Abilities						
HSRKPctl	.006	4.35	.037**	-.016	13.57	.000***
SATV	.000	.01	.926	.002	11.78	.001***
SATM	.000	.07	.784	.001	1.12	.290
Interaction						
Non_Athl	-.000	2.13	.145	.000	1.47	.226

*** - P <= .01, ** - P <= .05

Adding current non-athletic composite index appears to have no effect on the coefficients of the other "control variables." This suggests that this newly added variable is not significantly correlated with the earlier "observed" personal characteristics or cognitive abilities variables.

More importantly, it is also noted that the variable is not statistically related to leadership ascendancy of First-Class Midshipmen. This finding is important since this variable is currently one of the seven identified high school applicant variables that comprises the candidate multiple score. This finding brings into question the validity of the current measure of non-athletic participation currently used to score the Candidate multiple.

D.   MODEL THREEB

The fourth model adds the created categorical variables persit, quitt and partic to the model. The results of this version are shown below in Table 4.3 (B).

Table 4.3 (B). Multinomial Logit Models of Leadership Ascent Categorical, Cognitive, Demographics, Class Year Effects

Independent Variables	Lowest Striper Category (One Striper, Midshipman in Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
Intercept	-.173	.13	.713	-3.637	32.79	.000***
Demographics						
BLACK	-.039	.08	.771	.496	5.82	.016**
HISP	.381	4.01	.045**	.764	7.70	.006***
OTHER	-.076	.16	.691	.293	1.13	.287
FEMALE	.282	7.13	.008***	.127	.89	.344
MILPNAVY	.002	.00	.978	.103	1.10	.294

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Table 4.3 (B) (Continued)

Independent Variables	Lowest Striper Category (One Striper, Midshipman In Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
PRIORENL	.159	2.73	.099	.436	11.15	.001***
Class Year						
95	.495	21.11	.000***	.229	2.82	.093
96	.461	19.02	.000***	.174	1.66	.197
97	.380	13.13	.000***	.038	.08	.782
98	.173	2.62	.106	.001	.00	.994
Cognitive Abilities						
HSRKPctl	.004	2.37	.124	-.014	9.64	.002***
SATV	-.000	.00	.954	.002	11.48	.001***
SATM	.000	.07	.972	.001	1.55	.213
Interaction						
Persit	.040	2.17	.141	.108	10.87	.001***
Quitt	-.003	.01	.927	.056	1.81	.178
Partic	-.119	14.87	.000***	.020	.29	.590

*** - P <= .01, ** - P <= .05

Once again, the logit coefficient of the control variables specified in Models One and Two do not significantly change when the new measures of non-athletic participation are added in this Model version.

Of importance, however, is that the new measures of participation and persistence are statistically significant. Those who participate in the selected non-athletic activities (See Table 4.3 above), are less likely to be assigned the lowest leadership positions; while those who persist in other non-athletic activities (Refer to table 4.3 above) are more likely to achieve the highest leadership positions. These findings are in stark contrast to the earlier model, which uses the current

non-athletic activity composite score. In essence, engaging in some non-athletic

activities can be a significant predictor of Midshipmen leadership potential.

E.   MODELS FOURA

The last two models variants interact high school size with the non-athletic

activity variables to determine if this new information can better predict the effects

of non-athletic participation on leadership ascendancy. The results for the first

version (Model 4 (A)) that interacts school size with the current non-athletic

composite score is shown below in Table 4.4 (A).

Table 4.4 (A). Multinomial Logit Models of Leadership Ascent: Categorical, Cognitive, Demographics, Class Year Effects

Independent Variables	Lowest Striper Category (One Striper, Midshipman in Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
Intercept	.006	4.28	**.039**	-3.425	29.71	**.000***
Demographics						
BLACK	-.041	.09	.764	.531	6.66	**.010***
HISP	.391	4.24	**.040**	.791	8.26	**.004***
OTHER	-.076	.16	.691	.308	1.25	.264
FEMALE	.268	6.48	**.011**	.143	1.14	.286
MILPNAVY	.007	.01	.922	.086	.77	.381
PRIORENL	.140	1.81	.179	.407	8.51	**.004***
Class Year						
95	.469	19.39	**.000***	.297	4.84	**.028**
96	.442	17.82	**.000***	.229	2.92	.088
97	.372	12.62	**.000***	.057	.17	.679
98	.150	1.99	.159	.052	.14	.704
Cognitive Abilities						
HSRKPctl	.006	4.28	**.039**	-.017	13.67	**.000***
SATV	.000	.01	.943	.002	12.02	**.001***
SATM	.000	.09	.762	.001	1.00	.318

Table 4.4 (A) (Continued)

Independent Variables	Lowest Striper Category (One Striper, Midshipman in Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
Interaction						
Sm*Non_At	-.000	.45	.501	.108	.45	.501
Md*Non_At	-.000	2.87	.090	.000	.06	.806
Lg*Non_At	-.000	1.43	.232	.000	3.15	.076

*** - P <= .01, ** - P <= .05

While no changes in the earlier specified control variables are found, we do notice a few differences in the estimated impact of non-athletic extra-curricular participation once school size is explicitly accounted for in the model. While this specification brings two variants of the non-athletic measure to near statistical significance (at p<=.05), overall nothing is gained by adding school size to the present Admissions Board's measure for non-athletic Extra-Curricular Activity participation.

F.   MODEL FOURB

The next model is similar to that above except now we interact high school size with the three participation/persistence variables discussed earlier in Model 3 (B). The results for this model are shown below in Table 4.4 (B).

Table 4.4 (B). Multinomial Logit Models of Leadership Ascent: Categorical, Cognitive, Demographics, Class Year Effects

Independent Variables	Lowest Striper Category (One Striper, Midshipman in Ranks) to Middle Category (Two-Striper)			Highest Striper Category (Three or More) Relative to Middle Category (Two-Striper)		
	Logit Coeff.	Wald Stat.	Sign. Lvl.	Logit Coeff.	Wald Stat.	Sign. Lvl.
Intercept	-.181	.15	.701	-3.617	32.40	.000***
Demographics						
BLACK ·	-.048	.13	.722	.518	6.32	.012**
HISP	.339	3.13	.077	.802	8.44	.004***
OTHER	-.115	.36	.551	.315	1.30	.255
FEMALE	.308	8.36	.004***	.115	.72	.395
MILPNAVY	.011	.02	.884	.097	.99	.320
PRIORENL	.157	2.62	.106	.434	10.99	.001***
Class Year						
95	.478	19.64	.000***	.244	3.20	.074
96	.410	14.90	.000***	.193	2.04	.153
97	.381	13.09	.000***	.031	.05	.822
98	.160	2.21	.137	-.001	.00	.996
Cognitive Abilities						
HSRKPctl	.004	1.78	.181	-.014	9.66	.002***
SATV	.000	.00	.992	.002	11.95	.001***
SATM	.000	.00	.972	.001	1.39	.239
Categorical						
Sm*Partic	-.145	6.00	.014**	-.071	.91	.341
Md*Partic	-.053	6.80	.009***	.026	1.14	.286
Lg*Partic	-.055	11.47	.001***	.026	1.90	.168
Sm*Quitt	.401	5.98	.014**	-3.450	NA	NA
Md*Quitt	.083	10.19	.001***	-.056	1.02	.311
Lg*Quitt	.073	14.58	.000***	-.063	1.71	.190
Sm*Persit	.099	1.64	.200	.197	4.50	.034**
Md*Persit	.011	.36	.551	.032	1.89	.169
Lg*Persit	.014	1.00	.319	.036	5.17	.023**

*** - P <= .01, ** - P <= .05

Once again, the logit coefficient of the earlier control variables do not change when the school size and non-athletic participation/perseverance variables are added in this Model specification. More importantly, this Model specification

highlights the impact of non-athletic participation and persistence. After controlling for high-school class size, participation in the selected activities reduces the likelihood of being assigned to the lowest leadership positions, especially for candidates from small high schools. Secondly, we now see those who start other non-athletic activities but last only one year (i.e., "quit") are much more likely to be assigned to the lowest First-Class leadership positions, while those who remain engaged in these activities for two or more years (i.e., "persist") are more likely to ascend to the highest leadership positions in the Brigade of Midshipmen especially for those from small high schools.

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V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

Leadership development has been important for the Naval Academy since its inception in 1845. The Admissions Board's role may be viewed as attempting to identify candidates who will excel in leadership in the Naval Academy environment and after graduation in the fleet. The importance of the Admissions Board cannot be overstated in this very important task. The findings of this thesis suggest that the current index of non-athletic participation is not measured correctly and it is this mis-specification that results in the insignificant relationship between non-athletic involvement of high school applicants (as measured in the Candidate Multiple) and leadership ascendancy as First-Class Midshipmen. This thesis provides qualitative and quantitative support for the hypothesis that participation and perseverance in selected non-athletic high school activities can predict the likelihood of candidates to ascend to higher positions of responsibility at the Naval Academy if it is measured correctly.

B. CONCLUSIONS

The findings illustrated in Chapters III and IV show that the three-tiered measure of non-athletic participation is more powerful than the current Admissions Board's composite score for predicting the propensity of candidates to ascend to higher positions in the Brigade.

The major findings in this study are that the three tiered-measure of participation, quitting, and persistence can be used to predict Midshipmen leadership ascendancy in models that control for traditional demographic background and cognitive measures. This finding is in contrast to generally insignificant relationships between currently measured non-athletic activities and Midshipmen leadership. In addition to the importance of these new measures of non-athletic ECA participation and perseverance, school size is found to be significantly related to Midshipmen leadership.

C.   RECOMMENDATIONS

These findings suggest it is possible to better predict leadership potential of candidates by their high school participation and perseverance patterns in non-athletic extra-curricular activities. Further, this approach could be applied to the candidate's high school athletic participation patterns to give the Admissions Board a more accurate picture of the abilities and self-esteem of candidates that are applying for admission to the Academy. Finally, these findings suggest that school size should be considered in determining the Candidate's multiple because of the differing opportunities in small, medium and large schools.

A similar methodology could be applied to predict the physical education quality point rating based on persistence in athletic activities. Key athletic activities could then be included in the Candidate Multiple to better meet the mission of the Naval Academy. Finally, these measures of persistence and

participation could be used to predict other measures of performance at the academy including academic performance, cumulative quality point rating and order of merit at the Naval Academy. In each case, the same methodology in this thesis could be used to analyze the effect of different key activities on performance at the Academy.

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